STOCKHAM PIPE & FITTINGS CO.
(Stockham Valve & Fittings Co.)
4000 10th Ave. N.
Birmingham
Jefferson County
Alabama

HAER No. AL-49

PHOTOGRAPHS

WRITTEN HISTORICAL & DESCRIPTIVE DATA

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Historic American Engineering Record
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HISTORIC AMERICAN ENGINEERING RECORD

STOCKHAM PIPE & FITTINGS CO.
(Stockham Valves and Fittings Co.)

HAER No. AL-49

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Location:	4000 10th Avenue North, Birmingham, Jefferson County, Alabama 35212, (second site) Birmingham Industrial District UTM: 16-520660-3,711,200
Date of Construction:	1918 (second site)
Present Owner:	Stockham Valves and Fittings, Incorporated
Present Use:	Production foundry, manufacturing gray and malleable pipe fittings and gray iron, ductile iron, steel, and bronze valves for gas and liquid flow control.
Significance:	Stockham Valves and Fittings grew from a modest early twentieth century company to become one of the world's largest producers of valves and fittings. Beginning in the mid-1920s, the firm utilized a unique mixture of state-of-the-art foundry technology and labor intensive manufacturing techniques to produce a wide variety of iron, bronze and steel valves and fittings.
Historian:	Bode Morin, 1994

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I. Introduction

In 1903, Stockham Valves and Fittings began foundry production in Birmingham, Alabama. Still in operation, Stockham's longevity is tied closely to its development of mass production foundry processes and increasing demand for its products. From simple, low-tech procedures, the firm automated through three distinct technological phases. The first mechanized many labor intensive processes and dramatically increased output. Equipment installed during the latter phases, while continually increasing production and reducing labor intensive positions, remained largely enhancements and improvements of systems installed during the first wave of automation.

Throughout the years of mechanization, the foundry never reached a level of automated mass production on par with other industries. To remain flexible amid high production of varied products, Stockham maintained large pools of labor to fill the gaps in automation without significant loss of output. Workforce organization resembled other industries in the South: black workers filled most labor intensive positions while white men held all supervisory and technical jobs.

II. Business and Technology

In 1885, twenty-four year old William Stockham began a foundry career after graduating from the University of Illinois. His first employer, the Illinois Malleable Iron Company, initially assigned him to the molding department where he assembled sand molds. Over the next few years, Stockham advanced to general manager and secretary. Within a few years he struck out on his own and opened a small foundry in Chicago[1], making small gray iron jobbing castings and later introducing brass and malleable lines. Unfortunately, the depression of 1893-1896[2] forced him to close his Chicago foundry.[3]

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[1]Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, Jane Faulkner editor, Stockham Valves and Fittings, Birmingham, Alabama, 1953. p. 10.

[2]Donald L. Kemmerer and Cylde C. Jones, American Economic History, McGraw Hill, New York, 1959. 354.

[3]Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, Jane Faulkner editor, Stockham Valves and Fittings, Birmingham, Alabama, 1953. p. 10.

Recognizing the mineral potential and growing economy of the "New South," William Stockham moved his wife and two sons to Alabama. In 1903, with borrowed funds, he rented a "ramshackle car barn" on 35th Street North in East Birmingham, installed hand loaded cupolas and gasoline engines and, with five employees, established Stockham Pipe and Fittings Company.[4]

Alabama led the south in metal manufacturing. Endowed with vast coal and iron ore fields, pig iron production in Alabama increased tenfold from 1880 to 1889, more than twice the combined output of the next largest Southern producers, Tennessee and Virginia, and greater than the combined total of all remaining Southern states.[5] At the center of this burgeoning iron empire sat the industrial city of Birmingham, aptly named after the iron capital of England.

Local residents had been aware of the rich deposits of ore in Jefferson County for many decades. Native Americans used the red ore for war paint and early settlers used it to dye clothes. As early as 1830, published accounts of the region's ore fields were available in the North,[6] and three antebellum furnaces worked the fields.[7] But without a viable and inexpensive means to transport mined ore and equipment, Alabama fields received little large-scale development. In the late 1860s, a group of Montgomery, Alabama businessmen, with knowledge of an impending railroad junction in Jefferson County, formed the Elyton Land Company and purchased large tracks of land near the crossing with the intent of creating an industrial city serviced by the railroads. After several successful purchases, the town began to take shape. By November 1871, Birmingham had largely been laid out when the first lot sold at auction, one month before official incorporation.[8]

The proximity of iron ore, coal, limestone, and railroads attracted Northern investors like William Stockham. Between 1880 and 1900, Birmingham District companies erected more new blast furnaces than any other regional producers in the United States

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[4]Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953. p. 10.

[5]Stockham Valves and Fittings, p. 126.

[6]Malcom C. McMillian, Yesterday's Birmingham, E.A. Seemann Publishing, Miami, Florida, 1975. p. 11.

[7]McMillian, p. 12.

[8]Newbill, p. 4.

outside of Pittsburgh.[9] But furnace operators learned early that the native coal and iron did not smelt well in large Pittsburgh-style blast furnaces. Regional coke was soft and wore down easily, especially in the presence of the hard local Red Mountain ore. Iron makers had difficulty maintaining a sufficiently high coke bed in the large-style furnace because the smaller pieces of coke, burning too quickly and too high in the stack, reduced before they reached the high temperature zones of the hearth area where most of the iron melted.[10]

The high phosphorus content in local ores compounded the problem of large blast furnaces, proving difficult to remove in making steel. In particular, the converter steel process, widely used in Northern furnaces, could not effectively exhaust the large phosphorus quantities as it reduced the amount of carbon and silicon. The open hearth method was not economically feasible in the South because of the need for large amounts of scrap for chemical control. Instead of steel, Alabama furnaces soon focused on foundry iron, better suited for smaller blast furnaces and high phosphorus iron ore. To exploit these advantages, the large companies involved in foundry iron production lured large cast iron pipe makers to the Birmingham area.[11] Following the application of the centrifugal process to cast iron pipes, according to notes of Jack Bergstresser, "Alabama developed the country's first large rationally organized mills, replacing traditionally-oriented small-scale pipe-making operations." The extensive quantities of coal and foundry grade ore and a rapidly developing foundry market made the Birmingham district the nation's largest and cheapest producer, making 25% of the nations foundry iron in 1915 and over 40% by 1940.[12]

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[9]Bergstresser, Jack Roland, Sr. "Raw Material Constraints and Technological Options in the Mines and Furnaces of the Birmingham District: 1870-1930," Ph. D. dissertation, Auburn University, 1993. p. 1.

[10]Bergstresser, p. 26-27.

[11]Bergstresser, p. 202.

[12]Bergstresser., p. 3. Throughout the nation, the foundry industry evolved rapidly during the first three decades of the twentieth century, largely on the basis of Birmingham iron. Increases in domestic commercial and industrial construction, ship manufacture, automobile production, and a growing petrochemical industry demanded ever larger supplies of cast iron. The majority of these foundries were located in the north, supplying automobile and industrial manufacturing. Ten of the top eleven foundry states, stretching from the mid-west to the

The car barn Stockham rented was crude at best. Gasoline engines powered the machinery and twice weekly[13] men hauled wheelbarrels loaded with coke and pig iron up long inclines into the cupola. The first products manufactured by Stockham Pipe and Fittings--brake shoes, sash weights, car wheels, and manhole covers--were relatively simple. Soon thereafter, the firm began casting iron soil pipes, a commodity in demand in growing municipalities, and iron screwed and flanged fittings that required the addition of tapping and machining equipment.[14]

Stockham discontinued making large scale pipes and concentrated solely on screwed and flanged fittings.[15] This decision expanded the firm's production and brought it into national markets. By 1914, Stockham employed 200 men, had replaced its old gasoline powered system with steam,[16] and had acquired large tapping machines for the machining room. As the firm grew, it added rooms and buildings as needed without much concern for production flow.[17] Materials were still largely transported by wheel barrels and molds were hand-set and floor-poured with small

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Atlantic ocean and including Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania, New Jersey, New York, Connecticut, and Massachusetts, accounted for over two-thirds of all U.S. foundries in 1928. With 96 foundries (29 located in Birmingham), Alabama ranked fifteenth in the country. Nonetheless, from the mid-1910s through the depression the state had the second highest number of foundries in the South behind Missouri. Birmingham companies, American Cast Iron Pipe, Stockham Pipe and Fittings, Avondale Stove, Continental Gin, Southern Bolt and Nut, Birmingham Boiler, and Decatur Car Wheel for example, cast a wide variety of consumer, construction, and industrial items for national and international markets.

[13]__________. "Builders of Birmingham," Birmingham Post Herald, June 4, 1931.

[14]Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953. p. 10-11.

[15]Stockham Valves and Fittings., p. 12.

[16]Stockham Valves and Fittings., p. 12.

[17]Tanya English. "Foundry-based Industry in Birmingham, Alabama 1872-1925." Masters of Science Thesis, Birmingham (England) University, 1993. p. 48.

crucibles. Nonetheless, although business had expanded and production increased, the firm maintained a fairly low level of automation.

By the mid 1910s, many labor saving processes were available to foundry operators, and Stockham adopted and modified several over the next decade. Throughout the industry, molding machines had undergone extensive changes and were widespread by the turn of the century. By 1917, many foundries had adopted cupola charging machines and systems of elevated conveyors.[18] While Stockham did not mechanize extensively in these early years, it developed a portion of the business that became a major component of later operations.

Once Stockham acquired the necessary thread cutting and cleaning machines to produce fittings, it created a machine and tool shop capable of building, supplying, and maintaining this equipment.[19] Although continuing to purchase machines, the shop bestowed operational self-sufficiency by permitting construction of diverse production and auxiliary equipment. By WWI, the firm was designing and building its own machining and finishing equipment, including the legendary "Jumbo" tapper. Standing over ten feet tall and originally steam-powered by overhead belts, "Jumbo" cut screw threads in fittings through the 1950s.

In 1914, Stockham Pipe and Fittings suffered its second major fire in six years. Sparing the main foundry, fire consumed the tapping room, machine and pattern shops, and the steam boiler and engine room. As Stockham rebuilt once again, the firm began planning a new foundry, with a reduced fire risk and more room to expand. Slowed by the war, the company selected a new site five blocks away on 40th Street North and, in 1918, established a new foundry with a separate office building, locker house, cleaning room, and machining-tapping department.[20]

The open site permitted the company room to layout an entirely new plant with efficient production flow and room for future expansion. Although several years away from introducing its first automated system, the ability to handle dramatic changes in operation was understood soon after the 1914 fire and incorporated into plans for the new buildings.

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[18] J.H. Whiting "Progress in Foundry Equipment Manufacture," The Foundry, vol. 45 (September, 1917), p. 375.

[19] English, p. 49.

[20] Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, p. 12.

Noting the direction of new foundry construction, E.L. Shaner observed in 1916 that

> instead of erecting a group of buildings without considering the uses to which they are to be put, as was the practice in the early days of foundry history, proprietors are now arranging each feature of their new plants with a view to facilitating manufacturing operations.[21]

Selecting single story construction options, the new foundry and machining rooms reduced fire hazards, permitted less-obstructed expansion, and facilitated more efficient production flow at lower cost. Additionally, the buildings' sawtooth roof design incorporated north-facing windows permitting optimal light to enter the single floor without the glare or heat radiation associated with direct sunshine.[22] The company cast gray iron fittings in the main foundry and cleaned and tapped them in a building attached to the north. Workers showered in segregated facilities in the locker house. Engineers and upper management worked in a two-story office structure near the plant.
Business increases shortly after World War I quickly tested the 40th street site's ability to expand. In 1921 Stockham added a laboratory building and constructed a larger gray iron foundry and cleaning room north of the original. This new facility included space to cast steel and make cores, and would later house annealing ovens and a brass foundry. After the move to the new structure, the firm dedicated the 1918 gray iron foundry and cleaning room to tapping and galvanizing. Stockham also erected a shipping building across the yard to facilitate stocking the new Chicago warehouse. In 1923, the company constructed a new foundry to cast less-brittle malleable iron fittings.[23]

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[21]E.L. Shaner. "Your New Foundry Economically," <u>The Foundry</u>, vol. 44 (September, 1916), p. 379.

[22]Shaner., p.379-388.

[23]Foundry iron generally has been categorized by the color associated with the relative amount of free carbon that indicated the relative degree of hardness. Carbon, generally 2.5 - 4 percent by weight in grey iron, fully combines with iron in the molten state. As the iron cools, portions of the carbon precipitate out as graphite, while the rest remains in solution as cementite. If cooled slowly, more carbon falls out of solution, effecting a less hard and more desirable casting. If, however, the piece is too small to cool slowly, silicon is added to encourage the precipitation of carbon. (Foundry irons are usually sold in grades based on silicon content. Larger castings that cool slower require less silicon than smaller castings.) When fractured, the broken grey iron surface presents a grey

Production was similar to fittings of gray iron, with the addition of annealing, or slowly heating and cooling castings in large ovens until most of the carbon had precipitated out of solution, leaving black iron.[24]

According to The Foundry journal in 1926, only two of 97 foundries in Alabama, and 214 of 5,785 foundries in the nation, exclusively cast malleable iron.[25] Although malleable produced a high-strength soft casting, annealing made it more expensive; by comparison, gray iron was cheaper and widely used for fittings in situations unconcerned with shock and vibration. Despite differences in the final stages of preparation, in the early 1920s Stockham produced both types of fittings using very similar equipment and labor intensive processes. Both gray and malleable iron production remained highly labor intensive.

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sooty appearance due to the graphite. Relatively inexpensive to manufacture, grey iron castings are strong, hard, and resistant to abrasion and wear, but also moderately brittle and without much resistance to shock or vibration. See Bruce L. Simpson, History of the Metal-Casting Industry, American Foundrymen's Society, 1969, 168-171 and Richard W. Heine and Philip C. Rosenthal, Principals of Metal Casting, McGraw-Hill Book Company, New York, 1955, 419-431.

Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, p. 13.

[24]White iron is low in strength and hard to machine because its carbon content, 1.8 - 3.6 percent, is fully dissolved in the iron when quickly cooled. Harder, considerably more brittle than grey iron, and without visible free carbon, it produces a white crystalline surface when fractured. Annealing white iron rearranges its molecules, allowing most of the carbon to precipitate out of the hardened castings. The new structure is softer than both white and grey irons and, because of the excess free carbon, presents a black surface when fractured. Malleable iron, because of its relative softness and ability to absorb shocks and vibrations without failure or significantly degenerated service, presents a product very adaptable to most situations. See Heine and Rosenthal, Principals, 430-431.

"Malleable Iron and Its Uses," The Foundry, vol. 45 (November, 1917), 505.

[25]________. "Foundry Count," The Foundry, vol. 56 (September 15, 1928) p. 745.

Pig iron, scrap iron, scrap steel, coke, limestone, and a variety of sands and clays generally arrived by rail car in the main yard. Each material was hand unloaded[26] into wheelbarrels, hand trucks or carts, and transported to the appropriate storage bin in either the gray or malleable departments.

The cupola, operated similarly to a blast furnace, still required hand-loading at Stockham well into the early 1920s. Workers weighed hand-filled charge buckets of iron, coke, or limestone, hauled them up an incline to the charging deck, and deposited them into the cupola through the charging door. Workers constructed a bed of kindling[27] on the sloped sand floor to a level above the tuyeres, followed by a layer of coke. Once ignited by a gas torch, the coke burned and heated the cupola with a natural draft before the first charge of iron dropped and the blast was turned on an hour later. As the iron melted, it picked up additional carbon from the combustion of coke and dripped to the sand floor and out the tap. As the charge reduced in size, iron, coke, and limestone were added until the desired melt had been achieved.[28] While molten iron flowed out the cupola tap into a storage ladle, impurities in the charge mixed with limestone flux to form slag and flowed out a separate tap.

Many firms melted raw materials for malleable iron in electric furnaces to ensure a higher degree of chemical control when producing white iron. Stockham, however, used a duplexing oven connected by troughs to the cupolas, a considerably less expensive process than electric heating for the amount of iron produced. In addition to molten iron storage and continuous tapping, the duplexing oven also slowly burned off carbon,[29] ensuring better results in the transformation from white to black iron. Workers moved molten iron from the melting/storage area to the molding floor by pulling a mobile ladle attached to an overhead carriage, or trolley, along an exclusive, closed loop I-beam circuit. Molders, responsible for shovel mixing and hand testing sand, and preparing and pouring molds, waited for the

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[26]Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, p. 17.

[27]T.N. Burman, "Foundry Man Writes of Cupola Practice," The Foundry. vol. 48 (January 1920), p. 16.

[28]R.E. Wendt, Foundry Work, McGraw-Hill Book Company, Inc., New York, 1928. p. 189-190.

[29]Richard W. Heine and Philip C. Rosenthal, Principals of Metal Casting, McGraw-Hill Book Company, New York, 1955. p. 553-554.

mobile ladle to come to their floor area and fill the crucibles they used to pour the molds. Each crucible generally held enough molten iron to pour only a few molds.

Mold making required both skill and ardor. Molders prepared their sand the night before by cutting used molding sand with fresh and carefully adding water or another bonding agent appropriate to sand condition and the type of casting.[30] Conditioning the sand determined the success of the pour, which in turn dictated the molder's piece-rate salary. If sand was too wet, the mold rejected the iron, which then "boiled out" of the gate; if it was too dry, sand would wash into the mold and mix with the iron; if it was too cold, it would cool the iron, slowing or even stopping the flow into the cavity. Molders carried sand back to their floors in wheelbarrels, mixed it with shovels and, by 1924, filled flasks on powered molding machines.[31]

Molders were responsible for all aspects of mold production. Making molds involved securing a pattern to a molding machine and placing a flask over it. Sand, loaded by shovel into the flask, overflowed the walls until the machine jarred or applied pressure, compressing it over the pattern. With the flask inverted and the pattern removed, the molder repeated the process with the other pattern half and added a pouring chute.[32] Cores made with higher silica content sand and organic bonding agents created interior spaces in the casting by providing a solid structure for molten iron to flow around. They required hand packing in permanent core-molds and baking in coal fired ovens. In the early 1920s, molders prepared each mold half, made cores,

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[30]Nell Irving Painter, The Narrative of Hosea Hudson, Harvard University Press, Cambridge, MA, 1979. p. 73.

[31]Hosea Hudson, Black Worker in the Deep South, International Publishing, New York, 1972. p. 25-27.

[32]Patterns make impressions in molding sand that allow for the casting plus internal tunnels for molten iron to flow through. The cope half of the flask includes a vertical opening in the sand, called a sprue, which is the primary entryway into the mold. Additional channels cut into both the cope and drag called runners, connect to the sprue to provide iron access to the actual mold cavity where it flows through relatively small openings called gates. The design and location of sprues, runners, and gates reduces the speed and pressure of potentially turbulent flow that could erode interior sand surfaces, ensuring that iron passes through the gates with slow laminar flow.

assembled the halves and poured each casting.[33]

After pouring, gases escaping through the sand and latent heat evaporating water in the molding sand broke down the organic bonds between core-sand grains. Once the casting cooled, workers forced the mold from the flask at the shake out. Flasks returned to the molding floors while molding sand, now mixed with spent core sand, was prepared for reuse. Most castings traveled extensively by wheelbarrel from department to department. From the shake out, gray iron fittings first visited cleaning stations that removed sprues and runners with hand-held hammers before workers ground off gates and "Jumbo" tappers cut screw threads into the inside space. Malleable fittings traveled to the annealing ovens in the gray iron foundry before cleaning and tapping.

Addressing the Chicago Foundryman's Club in 1925, G.P. Fisher argued the necessity for mechanization.

> The installation of mechanical equipment is more of a necessity than a convenience. Molding machines, traveling cranes, conveyors, trolley systems and other labor saving equipment have increased production to a point that was not regarded as within the range of human possibility 25 years ago....Power operated machinery now prepares the sand and delivers it to the various molding stations...In the larger foundries an electric traveling crane unloads all supplies (and) in many instances is employed to place material for the heat on the charging floor.[34]

By 1930, Stockham had installed each of these systems in some capacity at the foundry.

Throughout the early 1920s, Stockham Pipe and Fittings remained largely labor intensive despite regional workforce shortages. Moreover, demand for the firm's products grew, leading to the establishment of warehouses in Chicago and Los Angeles to serve a national customer base. These trends in labor shortages and rising demand coincided with the availability of proven technology to persuade Herbert Stockham, the firm's second president, to begin mechanizing operations; in 1926 he installed the first continuous molding machine and sand handing units in the gray iron foundry.

With the introduction of the new system, Stockham Pipe and Fittings effectively completed its first phase of automation,

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[33] Painter, p. 72.

[34] G.P. Fisher, "Mechanical Aids Used in Foundries," The Foundry, vol. 53 (January 1, 1925), p. 7.

reaching high levels of material and personnel control. The company was as technologically advanced, if not more so, than many high volume Northern foundries. In 1926, the Warren Foundry of Warren Ohio, one of the most advanced firms in the industry, mass produced gray iron automotive parts ranging in size from one to fifty pounds, exclusively on conveyors. Systems were "used exclusively...to transport the molds and finished castings, to handle the jackets, weights, bottom boards and sand, and in fact practically all of the materials necessary for the production of castings."[35] In 1925, the Lynchburg Foundry Company's Radford Works installed a cupola charging system very similar to Stockham's. Weighed scale cars transported filled charging buckets to an overhead crane on a single I-beam that continuously deposited bucket contents into the cupola until it reached the desired charged level.[36]

The continuous molding unit built in 1926 executed tasks normally performed by workers in several different areas. A continuous conveyor circled flasks through molding stations, pour areas, and the shake out. Used sand was conveyed to the top of a multi-story bin and mixed with fresh sand and binding agents below ground level. An elevator transferred the new mixture from the storage bin to overhead conveyors that fed individual bins above each molding machine. Separate molders prepared the top (cope) and the bottom (drag) flasks, and pulled a lever to release sand into flasks from the overhead bin. Molding machines then jarred or compressed the sand, completing the mold half. A third person set the cores in the mold before assembling the two halves.[37]

Completed molds traveled along the conveyor to pouring areas. Weights, attached to an overhead rail system moving at the same speed, lowered automatically onto the molds as the track dropped. Functionally, they applied pressure to the mold so molten iron would not fill or flow out of the flask's seams. Pourers filled ladles at the cupola and took iron to the pouring area along a similar trolley system. Unlike early 1920s operations, pourers performed their task standing on a platform traveling the same speed as the conveyor, simplifying the pour.

The shakeout was located at the halfway point between pouring and

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[35]Frank G. Steinebach, "Conveyor System Speeds Production of Small Cast Iron Automotive Parts," The Foundry, vol. 54 (April, 1, 1926), p. 254.

[36]William G. Hammerstrom, "Charges Cupolas Mechanically," The Foundry, vol. 53 (November 15, 1925), p. 908.

[37]Hudson, p. 29.

mold-making. Lifting molds onto a small frame over a below-ground conveyor, workers forced the sand and casting out, and replaced the empty flasks on the conveyor which took them back to the molding machines. Separated from the casting by perforated tumblers, sand traveled along a new conveyor up to the storage bin to be recycled, while workers delivered castings to rotating tumbling mills that broke off runners and sprues at the casting's gate.

Later in 1926, Stockham installed a second continuous molding unit and sand handling system in the gray iron foundry to make larger castings.[38] That same year, it replaced manual charging of the gray iron cupolas with a new crane charger.[39] Workers loaded the bottom-dropping charge buckets in the yard, and an overhead crane aligned on an I-beam picked up the buckets by their center lifting arm. The crane's movement was restricted to lifting the bucket from the yard, traveling along the beam, and placing the bucket on ledges in the cupola. As the crane lowered the bucket's lifting arm, secured to the pinnacle of an unattached conical bottom, the bottom separated from the sides and allowed the charge to drop.

Over the next three years, the company purchased an electric yard crane to unload raw materials, installed the first continuous molding unit with sand handling system in the malleable foundry[40] and the third in gray iron.[41] The firm built conveyors to unload fresh coke and limestone[42] and erected a cupola charger in the malleable foundry.[43] In the core room, Stockham installed core blowing machines that forced sand into core molds and purchased

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[38]Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. Stockham Engineering Job E-4572, 10/21/26.

[39]Stockham Valves and Fittings, Stockham job E-4576, 11/13/26.

[40]Stockham Valves and Fittings. <u>Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953</u>, p. 17.

[41]Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. Stockham job E-4691, 11/2/27.

[42]Stockham Valves and Fittings, Stockham job E-4675, 8/18/27.

[43]Stockham Valves and Fittings. <u>Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953</u>, p. 17.

new ovens for core-baking and malleable annealing.[44] The company also installed continuous cleaning mills. Essentially tumblers, conveyors linked these new machines to the shake out of the molding units. After being removed from the flasks, separation units sifted castings and deposited sand on conveyors that returned it to storage bins for reclamation. The castings traveled by conveyor directly to mills that removed runners and sprues without direct human contact.

In 1928, the company further expanded its line by adding steel fittings. Not cupola-producible, the new materials required an electric melting furnace for the tight control of small but very specific amounts of carbon, manganese, silicon, sulphur, and phosphorus.[45] Steel, however, accounted for only a small portion of the total output because its primary benefits, strength and ductility, could be met in most cases with malleable iron at considerably lower cost.

By the late 1920s, Stockham Pipe and Fittings had gained national recognition as a major supplier of a complete array of valves and fittings. Employing 1500 people and supplying warehouses in Chicago, Los Angeles, New York, Boston, and Houston, the company's fittings, which included 12,000 varieties, were used exclusively by several major corporations for projects, including Baldwin locomotives and Sun Shipbuilding and Drydock.[46] Just as Stockham reached this new plateau, however, the depression worsened and nearly closed the firm permanently.

Although the severity of the depression didn't hit Stockham until 1931, the firm experienced modest slowdowns in the mid 1920s. The gray iron department operated on a staggered system, three days one week and two the next, while the malleable foundry, working a full six days, ran only one system. This initial slowdown ended when the firm installed molding unit conveyors, but reappeared only a few years later.[47]

During the early 1930s, the foundry expanded output while reducing capital intensive operations. In 1931, Stockham

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[44]Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. Stockham job numbers: E-4779, 10/15/28; E-4677, 9/7/27; and Stockham, E-4673, 7/28/27.

[45]Stockham Valves and Fittings, Stockham E-4939, 1/3/30.

[46]________. "Builders of Birmingham," Birmingham Post Herald, June 4, 1931.

[47]Painter, p. 80-81.

purchased two large tracts of land adjoining the plant for future growth.[48] But during this same period, from 1930 to 1932, the company canceled over one third of its engineering jobs, notwithstanding the fact that the jobs had already gone through the long justification, approval, and cost allocation process.[49] Demonstrating lessons learned from the previous three years, however, the company initiated seventy-five percent fewer engineering jobs over the next three years, but completed them all. Compounding the difficulties of the depression, a New York bank sought control of Stockham in 1931 through an outstanding loan the company had obtained to finance the first phase of automation. A Birmingham bank averted this crisis by assuming the loan.[50]

Stockham Pipe and Fittings emerged from the depression in 1934 and began several decades of expansion with the opening of a warehouse in Philadelphia.[51] In 1935, the company set up a small brass foundry with gas-fired melting furnaces near the gray iron units and introduced its first line of valves. Stockham did not actually cast brass; it manufactured its first valves in bronze, offering high strength with corrosion resistance and pressure tightness.[52] After casting, accomplished with conveyors and sand bins similar to the gray iron systems, workers cut off gates and runners with power saws because the material remained too soft to break in a tumbling mill. Valve production required an entirely new department. In addition to casting, cleaning, and machining, valves needed stems, handles, gates, unions, and assembly. Stockham made most valve components either by casting or machining,[53] and erected a new building attached to the shipping room for assembly and testing.

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[48] _________. "Large Plot Bought in East Birmingham," Birmingham News, January 5, 1931.

[49] Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. E-4976, 1/22/30 to E-5086, 9/22/32.

[50] Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, p. 17.

[51] Stockham Valves and Fittings. Links to Better Living,.., p. 37.

[52] Harry M. St. John, Brass and Bronze Foundry Practice, Penton Publishing Company, Cleveland, Ohio, 1958. p. 10.

[53] Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. E-5146 and E-5147, 9/28/36.

The company expanded rapidly through the rest of the decade.[54] Soon after beginning bronze valve production, it started a line of less expensive iron body valves. It devoted most of its available capital to purchases of additional machinery and founding equipment needed for general expansion of all phases of production. Purchased and Stockham-made machines included molders, annealing ovens, brass and steel furnaces, large shot-filled tumbling cleaning mills, sand mixing and aerating equipment, mold conveyors, and tramrails and trollies.[55] Employment doubled from 1941 to 1945.[56]

As the company prepared for the production of iron body valves, World War II intervened, delaying their introduction for four years. In the interim, Stockham contracted with the Defense Department to forge and machine 75mm shells and erected a shop attached to the brass/bronze assembly building to house the new equipment. The company also manufactured practice grenades and bombs, alloy steel armor for tanks, and fittings for warships. After the installation of war-related equipment, the foundry operated at high capacities with few process or operational changes during the remaining war years.[57] In response to high quality, on-time defense production with positive labor relations,[58] Stockham received (1942) its first of three Army-Navy "E" production awards.[59]

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[54]Stockham Valves and Fittings. Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953, p. 18.

[55]Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. E-5113, 3/7/34 to E-5274, 12/27/39.

[56] Stockham Valves and Fittings. Monthly Labor Turnover Reports, January and July, 1922-1994 (excluding 1932-1936). 1/31/41 to 1/31/45

[57]Stockham Valves and Fittings., E-Jobs E-5275, 1-10-40 to E-5972, 12-30-49.

[58]Francis Walton, The Miracle of World War II, The MacMillian Company, New York, 1956. p. 474.

[59]The Defense Department awarded joint Army and Navy "E" awards to companies working on joint orders. Awarded to only four percent of WWII defence contractors, it was considered the "highest honor bestowed on a corporation." The Army and Navy "E" recognized, not quantity, but "quality of product, special difficulties overcome in its manufacture, promptness in meeting delivery dates,...economy and efficiency of production,... [worker] safety, degree of freedom from labor disputes and work

Following the war, Stockham embarked on a second phase of automation. In 1946, the company installed a track yard crane to unload raw materials and fill cupolas,[60] thereby eliminating hand unloading and loading.[61] In 1947, it replaced the gas-fired crucible furnaces in the brass foundry with electric melting furnaces, and the following year installed a "push button" cupola charger in the malleable foundry.[62] The new charging system consisted of skip, hoist, and track arrangement. The new overhead yard crane loaded the skip, filled with iron, coke, and flux, into a below ground bin equipped with magnets and clam shell scoops. When full and weighed, a hoist lifted the skip to the charging door along tracks that "toppled" the bucket into the cupola. This new arrangement resembled one of the first skip-hoist systems employed at a foundry and reduced the number of men needed for the operation from eighteen to just two.[63] During the last two years of the decade Stockham significantly increased valve production by constructing an addition to the old shell building to house iron and bronze valve machining and a new tool room. The firm also expanded and remodeled the office building and, after forty years of not manufacturing soil pipe, officially changed its name to Stockham Valves and Fittings.

By the early 1950s, production had increased from 100 molds per day per person, to 100 per hour for each three man team. Hand labor and Stockham-built and purchased core-blowing machines

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stoppages, and the factory's absentee record." See Francis Walton, <u>The Miracle of World War II</u>, The MacMillian Company, New York, 1956, 475-476.

[60]Stockham Valves and Fittings. Engineering Job Number Booklet, 1926-1992. E-5586, 10/28/46.

[61]Stockham Valves and Fittings. "A Days Run as Stockham," 16mm film produced in the early 1950s.

[62]Stockham Valves and Fittings. <u>Links to Better Living, the Story of Stockham, 50 Golden Years, 1903-1953</u>, p. 19.

[63]Whiting, p. 357.
Designed by the Griffin Wheel Company of Chicago, Stockham installed a skip-hoist at its detroit plant prior to the depression.

Boland, J.J. "Skip Hoist Charges Cupola," <u>The Foundry</u>, vol. 54 (August 1, 1926) produced cores at a rate of 100,000 per day.[64] In new, continuous annealing ovens installed in 1952, workers placed bucket-loaded castings in one end that were automatically pulled along rails and discharged several days later at the end of the process, the castings fully annealed. With the exception of the annealing ovens, each system produced at the speed of its operator. Although the equipment increased output and simplified processes, worker quickness and efficiency still drove production, encouraging the retention of incentive programs.

In the 1950s, Stockham constructed more buildings than it had since the early 1920s. In 1952, the firm built new personnel and Y.M.C.A. buildings, with segregated facilities, east of the gray iron foundry. In 1953, it constructed a shop, north of the malleable foundry, to house the new continuous annealing ovens, significantly enlarging it in 1958 when the entire annealing department moved into the new building. The company completed additions to the valve building and main office in the mid-1950s and, in 1958, the brass department moved into an entirely new foundry north of the malleable annealing structure.[65] Throughout the 1950s, Stockham also added additional equipment, updated several operations and expanded product lines. In 1950, it installed teletype communications between the main office and branch offices and warehouses, modernized the gray iron cupolas in 1951, expanded parking facilities in 1952, introduced steel valves in 1953, and in 1956 moved the production of wedgeplug valves, a process acquired through the acquisition of a New Orleans, Louisiana foundry, to Birmingham.

The last phase of mechanization occurred during the 1960s, 1970s, and 1980s, as two new pieces of equipment further increased output and reduced personnel needs: the Disamatic mold making and pouring machines and Laempe core makers. The Disamatics (Disas), were self-contained machines that replaced mold/conveyor unit number two in the gray iron foundry and units three and four in the malleable foundry. With three primary inputs--sand, molten metal, and cores--and an occasional pattern change, the Disas automatically set sand in continuous molds. The machines injected a fixed amount of conditioned sand into two mold spaces, compressed it over patterns, automatically set cores, and assembled the mold completely flaskless. The units then pushed the sand mold out of the cavity into a walled conveyor directly

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[64]Stockham Valves and Fittings. "Men, Molds, and Machines," 16mm film produced in the early 1950s. (Later, however, than "A Days Run.")

[65]Stockham Valves and Fittings. 75 Years of Great Promise, Stockham Valves and Fittings, Birmingham, Alabama, 1978, p. 15.

abutting the previous mold. The conveyor walls acted as a flask, retaining each mold's shape as it moved the line of sand, one mold length at a time, through the pouring and cooling areas to the shake out. The gray iron Disas maintained a hopper for molten iron that they automatically dispensed into completed molds. The whole process, which once used 12 three-man teams, now utilized five workers: one filled the iron hopper, another operated the Disa controls, a third operated sand handling and conditioning controls, a fourth changed patterns and loaded cores, while the fifth man acted as a relief. All workers were trained on the interchangeable positions.[66] Gray iron unit number three had a similar, but less mechanized, operation. Sand and flasks were automatically fed into the machine and compressed, but molds required manual core setting and final drag/cope assembly before being hand poured. Workers operated the two malleable Disas similarly, but filled individual mold cavities by hand from mobile ladles.

In 1970, the Waupaca Foundry, Inc. of Madison, Wisconsin installed Disas comparable to Stockham's malleable units. These machines produced molds on a 15 second cycle at a rate of 240 per hour. Iron pourers filled mold cavities 12 seconds after they were formed to allow sufficient cooling before the shake out and maintain the Disa's cycle. These molding machines further limited human intervention in the production process.[67]

The Laempe machines gave coremaking a similar level of automation. Previously, Stockham had updated older core blowers, and purchased new ones, with heated plates for fixing cores without the need for baking. The Laempes were a more automated version of enclosed heated core blowers yielding higher output. The machine automatically fed sand into molds from second story bins linked directly to primary sand storage supplies, offering a relatively limitless sand supply and less worker intervention. The Laempes pressed the sand and fixed the bond in one step with heated plates, while operators changed core boxes as needed and removed completed cores. This process reduced a workforce of 104 people producing 100,000 cores per day[68] to 60 people producing

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[66]Henry Tolbert, Personal communication.

[67]John M. Shaw, "Waupaca Foundry Grows with Flaskless Molding," The Foundry, March, 1970 (vol. 98), p. 123.

[68]Stockham Valves and Fittings. "A Days Run as Stockham."

300,000 cores per day.[69]

Both sets of machines further reduced workers' control of production. Continuous molding equipment, installed during the first phase of automation, operated only as fast as workers could produce molds. Similarly, the speed of core blower operators removing, emptying, and replacing core boxes, and filling sand hoppers limited the number of cores that could be produced. The new systems eliminated fluctuating levels of efficiency by forcing workers to conform to the speed of machine. On the other hand, while the systems automated in the second and third phases refined those mechanized in the 1920s, many labor intensive processes remained virtually unchanged, benefitting only from the assistance of overhead cranes, trollies, and fork trucks.

With fewer than twenty molding and pouring stations in the three foundries at peak production, the company's success depended on flexibility in the management of resources and support services. Production grew to include several varieties of steel, bronze, gray and ductile iron valves, and multiple designs and sizes of gray and malleable iron fittings. The number of different products reached the tens of thousands. The new processes required extensive materials handling between phases, including raw material storage and access, core making, and annealing, while other procedures, including machining, tapping, boring, painting, galvanizing, valve assembly, pattern making and storage, inspection, and machine making, construction, and maintenance still demanded extensive handling of individual items.

Mechanization at Stockham has reached an optimal level, balancing flexibility with production. Multiple product styles and sizes manufactured on one molding unit required several destination options; all traveled to cleaning areas by conveyor, but then either visited one of several stand alone, upright shot blast cleaning machines or went directly to a machining station specifically tooled to handle that particular product or size. To automate further will require an extensive and overly complicated network of conveyors, trollies, and cranes to the various station options following molding. Given the still available pool of relatively cheap labor and transportation equipment, the company has automated to the extent that it did not adversely complicate production.

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[69]Lawrence Sneed, Core Supervisor, 29 years, Stockham Valves and Fittings, personal communication, August 10, 1994. Each person was able to execute 450 Laempe cycles per 8 hour shift, producing as many as 5,000 cores per day given an eight core corebox.

Birmingham's foundry industry declined gradually from peak levels in the late 1940s.[70] At Stockham Valves and Fittings employment peaked at 2500 people in the mid 1970s, when the firm reached record output levels. From then on, the firm increased product lines and expanded distribution systems only through the acquisition and development of offsite divisions.[71]

Pollution became a national concern in the late 1960s and early 1970s. In Jefferson County's Jones valley, where low wind levels failed to drive off pollutants, clean air regulations forced the first foundry closures in the United States[72] and doctors advised lung patients to move.[73] Amid these conditions, Stockham took a relatively proactive stance and installed water treatment facilities and air cleaners well before regulations officially mandated them.[74] Moreover, in the 1980s, the Resource Conservation and Recovery Act mandated that all manufacturing waste products be handled and disposed of in ways that increased worker safety and reduced public hazards. The foundry industry produced relatively modest amounts of waste; nonetheless hazardous and non-hazardous separation, transportation, and disposal were high priorities for many firms.[75]

From the late 1970s, Stockham faced serious competition from both foreign producers and polyvinyl chloride (PVC). In the past, the company responded to difficulties primarily by increasing capital expenditures or diversifying production. Competitors in the international marketplace now produced similar items of nearly equal quality at considerably lower cost during a time of high United States inflation. Additionally, companies began manufacturing PVC pipes and fittings for light industrial, home

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[70]U.S. Department of Commerce, United States Census of Manufacturers for 1899, 1904, 1909, 1919, 1929, 1939, 1947, 1954, 1957, 1967, 1972, 1977, 1982, 1987.

[71]Stockham Valves and Fittings, Stockham, Building the Future Together, 1993.

[72]McMillian, p. 178.

[73]____________. "Birmingham Rises Through," Industry Week, January 10, 1972, p. 27.

[74]____________. "'Washing Behind our Ears,' says Pollution Clean-up Leader," Birmingham News, December 19, 1972.

[75]Thomas P. Kunes, "Foundry Waste Management Challenges for the '80s," Foundry Management and Technology, December 1990 (vol. 108), p. 40.

plumbing and sanitary use. These lower cost, lighter and easier to install materials eventually forced Stockham to eliminate four to twelve inch fittings.[76]

By the mid 1980s, Stockham had nearly maximized production on its existing technological base and found further refinement difficult. Ten years later, the company began retiring older equipment and facilities and redesigning products and processes to remove unnecessary materials and operations. The Birmingham foundry continues to manufacture valves and fittings; in the 1990s, advanced equipment and reduced production permitted the company to shut down several long running foundry units and eliminate over half of late 1970s workforce.

In the early 1990s, the firm responded to the new circumstances by restructuring its workforce organization. For financial reasons, Stockham discontinued sponsorship of sports teams, Y.M.C.A. programs, and its cafeteria and contracted the once free medical coverage to outside insurers. In 1993, following the shut down of several older units, the company eliminated the Bedaux system. Machinery installed during the last phase of automation removed most remaining effects of worker speed on production; equipment now drove output, reducing the need for worker incentives. Compounded with the number of personnel needed to track individual job components, the costs to maintain the system far outweighed its reduced benefits.[77]

III. Labor and technology

Birmingham industries successfully recruited many of their workers from the economically depressed, post-Civil War Black Belt.[78] Large pools of relatively inexpensive labor encouraged

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[76]Douglas Stockham, Stockham Valves and Fittings, personal communication, August 8, 1994.

[77]Douglas Stockham, August 8, 1994.

[78]Mineral resources and the juncture of two railroads located Birmingham just north of the Black Belt, a region stretching from central South Carolina through the mid-sections of Georgia and Alabama, across northeast Mississippi and into western Tennessee. Home to the largest and most lucrative antebellum cotton plantations, Black Belt counties reached African American population levels as high as two thirds. (Ayers, p. 5-6) Jefferson County, without a soil base that could support extensive cotton growth, remained relatively isolated. Enslaved persons accounted for only 20 percent of its 1860 population, as

early industries to forego technological innovations and retain older, labor-intensive, production methods. Indeed even the large manufactures like Sloss-Sheffield delayed adapting proven technologies until WWI era labor shortages made them necessary.[79]

Stockham rebuilt during the first wave of migration out of the South, and the new plant experienced high turnover throughout the early 1920s.[80] Low wages, unsanitary conditions, laborious work, and the monotonous routine[81] of foundry work compounded post-war labor shortages. The industry in general experienced high rates of turnover during this period. In fact, according to E.L. Shaner,

> the annual turnover of labor in the average casting plant exceeds that of any other industry and (a foundry manager is) forced to admit that any effort he can make to better satisfy his workmen will result in fewer strikes, less hiring and firing, and ultimately less indirect operating expense.[82]

Labor shortages permitted workers employment flexibility. In the early 1920s, the company routinely welcomed back workers who had gone "rambling about" for several months.[83] The company also adopted many of the paternalistic practices common throughout southern industry in the 1920s, in an effort to hold onto employees and raise their output. In 1920, Stockham constructed a segregated medical dispensary that, in addition to providing emergency work-related care, also supplied free health and later dental service to worker families. A Y.M.C.A. chapter was established in a new building in the early 1920s to provide hot

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compared to 80 percent in several Black Belt counties. (McMillian, p.11)

[79]U.S. Department of the Interior, Historic American Engineering Record (HAER), No. Al-3, "The Sloss Company," 1976. Prints and Photographs Division, Library of Congress, Washington, D.C. p. 17-25.

[80]Whiting, p. 375.

[81]C.C. Schoen, "Training Men for Foundry Duties," The Foundry, vol. 45 or 46, (February, 1917 or 1918) p. 59.

[82]Shaner, p. 381.

[83]Stockham Valves and Fittings. Bull Ladle, several issues during the 1920s issued brief statements welcoming back ramblers.

meals at cost, meeting rooms for segregated educational and spiritual assemblies, and sponsorship for sporting events and recreational activities. By the 1930s, the company also had erected a number of houses for its workers. The neighborhood, called Stockham Row, contained several rental homes,[84] a church, and park.[85]

Stockham segregated workers and jobs by race. White men filled all supervisory positions and skilled jobs, while black men were designated general labor and operator grades. Stockham paid molders only for each saleable casting they produced. If the cleaning department ruined it or the shipping room lost it, the molder was not paid.[86] Most black molders of the 1920s worked under "machine-runner" job classifications and received less than half the wages of "semi-skilled" white molders for similar duties. Management required black molders working on new machines to leave their positions as the company photographer shot their supervisors mimicking their operations.[87] Black molders also arrived an hour early and stayed several hours later than white workers to prepare for the next day's runs.

Mechanization restructured the workforce. Challenges and obstacles, once requiring skill and experience to overcome, were reduced to finite tasks and then mechanized. Machine operators specialized on one machine or process rather than the entire system. "Mechanizing and specializing jobs," wrote Stephen P. Warning, "restricted the discretion of those on the bottom of the

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[84]Painter, p. 86-87.

[85]Another local foundry, American Cast Iron Pipe Company (ACIPCO), took a similar approach to employee control and workforce stability. Under the slightly misguided heading "fraternalism," a 1918 article appearing in The Foundry stated that ACIPCO provided benefits to instill in its workers, of whom three fourths were black, "the spirit that the success of manufacture depends on them regardless of how insignificant may be their tasks." The firm constructed a village for black workers which, contrary to several other local company town developments, intermixed at least four distinct rental house designs. White employees, however, had more design options for homes that were considerably more elaborate and built to be sold and financed through a company sponsored real estate office. ("Making Good with Tradition Discarded," The Foundry, vol. 46 (March 1918), p. 115-127.)

[86]Hudson, p. 27.

[87]Hudson, p. 23 and 40.

organization and expanded the power of those on top."[88] Continuous molding machines specialized important molders' tasks: sand preparation, core making, setting, and pouring. New job categories included molders, core makers, and pourers; sand handling became mostly mechanized. A production run that might have employed 100 men, each involved in the majority of processes, could now be done with 50 specialists. Production increased 400 to 500 percent per man day for each three man team.[89]

Although the company eliminated many job categories, mechanization stopped short of Henry Ford-style mass production. Some operations defied automation. Mechanically blown and larger or complicated hand-formed cores required racking, baking, inspecting, and boxing before being transported to the mold making areas. In addition a variety of castings often traveled together on the same conveyor and required hand sorting and inspecting. Shot blasting mills and shot filled tumbling mills cleaned casting surfaces, but castings to be galvanized were placed on racks and hand dipped in acid baths prior to a zinc coating. Before annealing, sorted castings were loaded into skips or large wire baskets and moved from the malleable foundry; they were then hand loaded into ovens near the gray iron department. Each fitting required handling several times after being sorted. Any additional cleaning or grinding was done individually, followed by tapping, milling, storing, packing, and shipping. On the box floor section of the foundry, workers hand-made, poured, and cleaned castings too large to be placed on a conveyor. Machinists built and maintained conveyors, molding, and tapping machines, while pattern makers skillfully created the wood or metal forms used to make molding sand cavities.

Managerial reorganization accompanied the shift from skilled craftsman to machine operator. Transferring job control from workers to managers, specialization and mechanization "made it easier to measure individual performance against organizational standards and to motivate workers through productivity-based wages", notes Stephen Warning, a historian of scientific management.[90] In fact, the new production system made such motivation essential. The equipment installed at Stockham greatly enhanced potential output but did little to actually accelerate production.

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[88] Stephen P. Warning, Taylorism Transformed, The University of North Carolina Press, Chapel Hill, NC, 1991. p. 11.

[89] Hudson, p. 29.

[90] Warning, p. 11.

Thus, in 1931, the company initiated an incentive program that remained part of its management strategy for over sixty years. Time checkers traveled to every job in the plant, defining and analyzing each aspect of an individual task, in order to determine an average completion time for each activity. Called the Bedaux system after its inventor, American industrial engineer Charles Bedaux (1887-1944), workers received an hourly wage[91] and bonuses for each activity they completed over the average.[92]

Like all incentive programs, the Bedaux system was complex in operation. Time recorders measured each individual step in thousandths of a minute, summed the steps, and added 10 percent for contingencies. The total was then the number of points, or Bs (for Bedaux's), averaged for a job. The company based most bonuses on output levels, but many support or maintenance jobs could not be computed based on production. For example, a maintenance employee earned 21.6 Bs to change a 3/4 inch head to a 3/8 inch head on a tapping machine. Calculated on 20 individual steps, the job included removing tap (.311 minutes), changing chuck jaws (4.140 minutes), installing tap (.583 minutes), walking to tool room (.354 minutes), waiting at tool room (1.500 minutes), getting stock and adjusting water (.208 minutes), plus 1.960 minutes for contingencies.[93] Workers had to pass 480 Bs daily, equivalent to an eight hour shift, to earn a bonus. The company paid incentives at a 50% reduced rate such that if a man earned an extra 120 Bs, the company would pay him for an additional 60 minutes at his hourly rate.[94] All foundry jobs above general labor were put on the Bedaux system.

The ultimate goal of such systems was to increase production and meticulously track costs for each step in the process. Writing about a similar bonus program initiated by General Motors in 1920 at a Saginaw, Michigan high volume automotive foundry, H.E. Diller notes that the primary objective of establishing a standard time/bonus reward in the name of production was, "To stimulate the workman to greater effort to reward him in proportion to that effect and to measure the efficiency of the

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[91]Vest, Buddy. Industrial Engineer, Stockham Valves and Fittings, personal communication, August 8, 1994.

[92]Painter, p. 81.

[93]Stockham Pipe and Fittings. "Bedaux (sic) Measurement Record, Study #1, 3.4" B'ham Head to 3/8" B'ham Head," recorded by A.J. West, 5/24/35.

[94]Vest, personal communication.

workmen, individually or in groups."[95] The time-management system installed by General Motors resembled the later Stockham system closely. Each company paid workers an hourly rate and bonus for each piece over a daily average. The General Motors system, however, paid bonuses at an escalating rate once the worker passed 75 percent of the daily average for his job. Although General Motors expected workers to produce at 110 percent and earn a 20 percent bonus, it paid a 1.6 percent bonus for a 75 percent day, 50 percent for 125, and 80 percent for 150.

The division of labor along racial lines, the implementation of automated production systems, and the transition to the Bedaux system exacerbated the effects of the depression on Stockham workers. White males still held those skilled jobs that remained intact, such as machinist, tapper, lathe operator and supervisory positions, but the overwhelming number of jobs reduced to "line" status had been held by black workers. The discontent black workers felt grew out of the reduction in pay per unit produced, (an artifact of the implementation of conveyors and the Bedaux system) the overall depression-era reduction in wages and the number of jobs, and the unequal treatment of workers according to race. As in other industries and companies, such conditions sparked labor organizing drives.

The first attempt to organize Stockham labor occurred at the hands of the Communist Party in 1931.[96] The Party held public rallies around unemployment conditions, management-worker relations, the capitalist system, racial unity, and the civil rights of blacks. These efforts gained support among Stockham's workforce, the first group of Birmingham workers the Communist Party attempted to organize.[97] The group's major accomplishment came late in 1931 when a list of member's complaints, focusing on higher output for less pay, appeared in Southern Worker, a weekly communist paper from Chattanooga, Tennessee, and the Sunday Worker, a similar weekly published in New York. The papers received wide distribution at the plant. As a result of this publicity, the company addressed many of the long-standing complaints of black workers. In a statement read to employees, Stockham announced rigid starting and stopping times, stating

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[95]H.E. Diller, "Time Study Underlies Bonus System," The Foundry, vol. 48 (September, 1920), p. 683.

[96]Painter, p. 87.

[97]Robin D.G. Kelley, Hammer and Hoe, Alabama Communists During the Great Depression, University of North Carolina Press, Chapel Hill, North Carolina, 1990.
Painter, p. 82, 87.

that no man was to touch his machine before 7:00 A.M.; everyone would end work at 2:45 P.M.; each worker would have his machine cleaned by 3:00 P.M.; and jobs would stop at the 12:00 noon whistle and begin promptly at 12:30 P.M. In addition, any man, foreman or worker caught using profanity toward any other man would be fired.[98]

Stockham simultaneously conceded widespread demands for equitable treatment and reduced hours and intensified its search for Communist Party leaders. Party leaders claimed victory, calling for full organization, huge wage increases, job security, and unemployment and social insurance for men out of work.[99] Over the next few months, however, a "stool pigeon" program identified several group leaders, and those with company houses were evicted and fired. Without strong central leadership and wide support, other members feared for their jobs and left the party. By 1932, Stockham's communist movement had dissolved.[100]

For the next decade, the company successfully avoided the labor problems that plagued many northern industries. With the exception of depression era layoffs and production down-turns, working conditions remained stable. Stockham workers did not organize again until the early 1940s, when a federal mandate required World War II production contractors to maintain plants open to unionization.

By the early 1930s, Stockham had completed its first and most significant shift to mass production, and with a couple of exceptions, the remaining decades would largely be improvements on 1920s innovations. Under very difficult financial and labor conditions, the company completed transitions from hand ramming to mold making machines, floor pouring to moving platforms and conveyors, and wheelbarrels and shovels to sand mixers and overhead conveyors. Workers benefitted from medical and dental services, housing, disability payments, and inspirational, educational, and athletic activities. Nonetheless, they were discouraged from organizing, and racial divisions continued to characterize job assignments.[101]

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[98]Hudson, p. 41-42.

[99]Hudson, p. 42.

[100]Painter, p. 90-93.

[101]Black workers remained the majority in labor intensive positions, existed in a highly segregated community, and even though promised that directed cussing would not be tolerated, believed that meant black workers would be fired and probably

Although larger machines, new products, and expanded facilities greatly enhanced production, many operations at the foundry were still labor intensive. After castings were cleaned, workers separated, inspected and transported fittings and valves to machining areas to be individually ground, milled, tapped, and bored prior to final assembly or hand-packing into home-made barrels. Workers kept tumblers filled with shot, hand-removed runners and sprues from castings too soft or too large for the tumbling mills, and packed, poured, and shook out by hand very large or limited production castings on the box floor. Fork trucks, overhead cranes, and trollies reduced the overall direct contact workers had with individual pieces without necessarily reducing personnel levels.

The Bedaux system, employed since 1931, received a modest change in the mid 1950s. The United Steelworkers, established at Stockham under World War II federal mandates, forced the incentive scale up from the reduced premium of 50 percent to a full 100 percent for all work above the daily average. After a decade of struggle to improve benefits, the union struck Stockham in 1959, shutting down the plant for over a month before winning hourly and incentive raises, more vacation pay, and changes to seniority rules.[102]

Nonetheless, segregation policies of the mid 1920s remained. Black workers still filled the vast majority of "unskilled," labor intensive positions. They made and set molds, poured castings, ran tapping and shear cutting machines, separated castings, and transported them between production destinations. White workers, on the other hand, filled the "skilled" positions operating all lathes and tool making machines, making and repairing patterns, inspecting finished products, and holding all supervisory positions.[103]

New buildings and programs were racially segregated. The locker house and Y.M.C.A. cafeteria, meeting rooms, and bathrooms, although equal in most amenities, had separate entrances for black and white workers, and walls separated the two sides. Workers approaching the plant together separated when they

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blackballed from industrial work in the state, while white workers would simply be reassigned. See Hosea Hudson, Black Worker in the Deep South, International Publishing, New York, 1972, 42.

[102] ________. "Stockham Union OKs Contract," Birmingham Post Herald, June 10, 1959.

[103] Stockham Valves and Fittings. "Men, Molds, and Machines."

reached the segregated guard gates[104] and used separate bathrooms and drinking fountains[105] once inside. The company's newsletter contained a separate "Colored News" section from 1920 through 1945 and continued to have racially separate sections until the late 1960s. Additionally, Stockham sponsored outdoor events, picnics, and sports teams. It held picnics for white workers and their families during the 1950s at Camp Crosby in the "rolling hills" near Birmingham while entertaining black families at barbecues on plant grounds or at Shannon Park, a recreation area built for "negro" children and possibly named for 1950s era vice president L.N. Shannon.[106]

During the 1960s, Birmingham maintained an industrial, "tough town" image and, as Richard K. Scher wrote, was "one of the most rigidly segregated cities in America."[107] The city's industries reflected the resiliency of nearly a century of racial segregation.

Stockham maintained segregated black and white job classifications until 1965, and segregated facilities into the 1970s. In 1970, several hundred black workers sued, charging the company with "discriminating against black employees in hiring, promoting, job classification, and screening tests."[108] They sought not only back pay but an end to segregated shower, eating, and plant facilities and a change in hiring and promotion policies.[109] In response to these allegations, a Stockham attorney attempted to demonstrate that the company offered "more benefits to black employees than any other employer in the Birmingham area."[110] The law suit, brought under the 1964 Civil Rights Act, lasted twelve years. The settlement reached in 1982,

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[104]Stockham Valves and Fittings. "A Days Run as Stockham."

[105]Tolbert, Henry. Iron Molder, 31 years, Stockham Valves and Fittings, personal communication, August 8, 1994.

[106]Stockham Valves and Fittings. "A Days Run as Stockham."

[107]Richard K. Scher, Politics in the New South, Paragon House, New York, 1992. p. 260.

[108]___________. "Valves Firm Bias Suit Trial Begins," Birmingham Post Herald, February 5, 1974.

[109]___________. "Years of Toil Pay Off for Trio who helped win Stockham Suit," Birmingham News, May 9, 1982.

[110]___________. "Valves Firm Bias Suit Trial Begins," Birmingham Post Herald, February 5, 1974.

paid $1.65 million to 5,600 workers for violations extending back to 1965.[111] Paternalism and segregation at Stockham Valves and Fittings in many respects resembled practices throughout southern industry and society. They gave Stockham and other companies a degree of control over workers that allowed them to compete successfully with northern firms.

IV. Conclusion

Stockham Valves and Fittings started modestly in a used car barn in the region of the country producing the best foundry iron available. Though adapting and maintaining tight control of production and labor, the firm expanded from five original employees producing tens of different products to 2,500 employees producing over one thousand. The firm remained current with foundry technology, optimizing automation with available labor resources. Expanding and modernizing for over 75 years, Stockham reached a point where optimal production was not cost effective enough to remain competitive in an increasingly global market. As the firm sought new areas of valve and fitting production, they entered a phase of extreme downsizing, operating only the most productive systems with a minimum number of employees.

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[111] ____________. "Years of Toil Pay Off for Trio who helped win Stockham Suit," Birmingham News, May 9, 1982.

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ADDENDUM TO
STOCKHAM PIPE & FITTINGS CO.
(Stockham Valve & Fittings Co.)
Birmingham Industrial District
4000 10th Avenue North
Birmingham
Jefferson County
Alabama

HAER No. AL 49

HAER
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